

# Hao Yu

Department of Computer Science  
Texas A&M University  
College Station, TX 77843-3112  
USA

Home: (979) 862-9633  
Fax: (979) 847-8578  
Email: h0y8494@cs.tamu.edu  
URL: <http://parasol.tamu.edu/people/h0y8494>

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## Education

- Ph.D. in Computer Science**, Texas A&M University, 1997–2003  
Dissertation: Run-time Optimization of Adaptive Irregular Applications.  
Research advisor: Lawrence Rauchwerger
- M.S. in Computer Science**, Tsinghua University, PR China, 1997
- B.S. in Computer Science**, Tsinghua University, PR China, 1994

## Professional Skills

- Programming Language:** Excellent working knowledge of C/C++ (over 100,000 lines of code in large projects). Excellent working knowledge of FORTRAN, PERL, UNIX shell, SQL and DSP Assembly. Working knowledge of Java, SQL, Python, BASIC. Experience with various assembly languages: PA-RISC, PC-i386, MIPS.
- Software, Tools, etc.:** Excellent working knowledge of OpenMP, MPI, STL, POSIX Threads, CVS. Working knowledge of JDK, JBoss, COBRA, Oracle, UML.
- Hardware and Software Systems:** Excellent working knowledge on SGI Origin 2000/3800, SGI Power Challenge, Cray J90 and IRIX (3 year part-time system administration) and HP-V Class and HP-UX OS (used as the major compilation target platform). Experience with IBM Regatta(based on POWER4), SUN Enterprise and corresponding OS Solaris, AIX (also used as compilation target platforms). Working knowledge of Linux (maintaining and working on PC-Linux workstations).

## Experience

- Research Assistant**, Department of Computer Science, Texas A&M University 1997 – present  
Research is focused on integration of static program analysis and automatic run-time optimization techniques for detecting and exploiting parallelism and performance in real-world irregular applications. Irregular applications are programs with data array accesses via indirection, with typical examples as simulation programs (CFD, molecular dynamic, circuit simulation) and programs involving sparse linear algebra. Furthermore we have developed an adaptive algorithm selection framework which can select the best parallelization algorithm adapting to a program's dynamic behaviors. In addition, I have participated in a DOE ASCI project : Efficient massively-parallel implementation of modern deterministic transport calculations. The program is written on STAPL, a parallel counterpart of C++ Standard Library (STL), which is developed by our research group (Compiler group of Parasol Lab.). Through the research, I have accumulated extensive experiences and knowledge on program optimization, compiler development and high-performance computing, etc.
- Graduate Assistant**, Texas A&M University Supercomputer Center, 1999 – 2002  
The center hosts parallel computers, e.g., IBM Regatta (32 procs.), SGI Origin 2000 (32 procs.), SGI Origin 3800 (64 procs.), CRAY J90 (16 procs., retired on 2000), SGI Power Challenge (24 procs., retired on 2001), to be used by the Texas A&M research community at large. My activities included porting, optimizing and parallelizing users' applications, benchmarking, in house program and web development, teaching short course and system administration.

**Sr. Engineer**, Aerospace Jinsui High Tech Ltd. (now as Aerospace Information Co. Ltd.), Beijing, PR C, 1994 – 1997

As one of the key engineers in developing the company's core product: Jinsui card, a general purpose encryption card using a DSP chip, I have actively participated in the entire development cycle of the product (card design, program development (in assembly), optimization, test and pre-sale). Today, the card is widely used in an Anti-fake and Tax Rein System to manage and supervise the Value Added Tax payment and prevent it from tax dodging, tax deceiving and tax evasion. Currently, the system is recommended by the government and is used by about 500,000 companies and families in China.

**Application Developer** (part time), Tsinghua Ziguang Ltd., Beijing, PR China 1992 – 1994

I have actively participated in two large projects: a Management and Information System for the Accounting Division of the National Office for the Overseas Chinese (using Sybase and Foxpro); a MIS for Legend Group (the largest computer company in China) based on Informix database on IBM AS/400. I have also developed a householding database system written in C++ and participated in several network layout and configuration projects.

**Research Assistant**, Department of Computer Science, Tsinghua University, PR China 1991 - 1997

The MS thesis is on the development of a fast modulo-multiplication algorithm for public key cryptography algorithms (RSA, IDEA). Based on the developed algorithm, I have implemented a general-purpose encryption software package, which includes RSA, IDEA, DES and public key generation. During my undergraduate study in Tsinghua, I have developed an experimental environment that is used in the "Computer Graphics" course and a B+ tree query system for a production graphic database while I was working in the Computer Graphics and Visualization group (now under the Division of Computer Software). My first year-long project was a Computer Aided Teaching system that is used in the "Physics Experiments" course of the Department of Physics of Tsinghua University and I used Borland C++.

**Teaching Assistant**, Department of Computer Science, Tsinghua University, PR China 1994 - 1995

The courses were Graph Theory and Computer Security. My duties included designing and leading exercise/lab sessions, designing homework and projects, and grading.

## Research Interests

Optimizing Compiler, Program Optimization, Automatic Run-Time Parallelization, Performance Analysis and Modeling, Parallel and Distributed Systems, Data-Intensive Computing.

## Publications

"Run-Time Optimization of Adaptive Irregular Applications", **Hao Yu**, PhD thesis, Department of Computer Science, Texas A&M University, Dec. 2003.

"Parallel Reduction: An Application of Adaptive Algorithm Selection", **Hao Yu**, Francis Dang and Lawrence Rauchwerger, in proceedings of *the 15th Annual Workshop on Languages and Compilers for Parallel Computing (LCPC'02)*, pp. 171-185, College Park, MD, July 2002

"The R-LRPD Test: Speculative Parallelization of Partially Parallel Loops", Francis Dang, **Hao Yu** and Lawrence Rauchwerger, in proceedings of *the 16th International Parallel and Distributed Processing Symposium (IPDPS'02)*, Fort Lauderdale, FL, April 2002.

"SmartApps – An Application Centric Approach to High Performance Computing: Compiler-Assisted Software and Hardware Support for Reduction Operations", Francis Dang, Maria J. Garzaran, Milos Prvulovic, Ye Zhang, Alin Jula, **Hao Yu**, Nancy Amato, L. Rauchwerger and Josep Torrellas, in *NSF Next Generation Systems Program Workshop (NSFNGS)*, in conjunction with *IPDPS'02*, Fort Lauderdale, FL, April 2002.

- “Architectural Support for Parallel Reductions in Scalable Shared-Memory Multiprocessors”, Maria Jesus Garzaran, Milos Prvulovic, Alin Jula, **Hao Yu**, Ye Zhang, Lawrence Rauchwerger, and Josep Torrellas, in proceedings of *the 6th International Conference on Parallel Architectures and Compilation Techniques (PaCT’01)*, pp. 243-254, Barcelona, Spain, September 2001.
- “Adaptive Reduction Parallelization”, **Hao Yu** and Lawrence Rauchwerger, in proceedings of *the ACM 14th International Conference on Supercomputing (ICS’00)*, pp. 66-77, Santa Fe, NM, May 2000.
- “Techniques for Reducing the Overhead of Run-time Parallelization”, **Hao Yu** and Lawrence Rauchwerger, in proceedings of *the 9th International Conference on Compiler Construction (CC’00)*, Berlin, Germany, March 2000. Also, in *Lecture Notes in Computer Science*, Springer-Verlag, Volume 1781, pp 0232.
- “Run-time Parallelization Techniques for Sparse Applications”, **Hao Yu** and Lawrence Rauchwerger, Technical Report TR99-025, Department of Computer Science, Texas A&M University, September 1999.
- “Run-time Parallelization Optimization Techniques”, **Hao Yu** and Lawrence Rauchwerger, in proceedings of *the 12th Annual Workshop on Languages and Compilers for Parallel Computing (LCPC’99)*, San Diego, CA, August 1999. Also, in *Lecture Notes in Computer Science*, Springer-Verlag, Volume 1863, pp 0481.
- “Development and Implementation of a DSP Based Encryption Card”, **Hao Yu**, Master Thesis, Department of Computer Science, Tsinghua University, China PR, June 1997. (in Chinese)
- “An Authorization Model for Encrypted Database System”, Jie Shang, Yiqi Dai, **Hao Yu**, in *Journal of Computer Application Research* (in Chinese), Extended Issue, 1996.
- “Software Methods to Implement RSA on DSP”, **Hao Yu**, Baoan Guo and Yiqi Dai, accepted by the *4th UK/Australian International Symposium on DSP for Communication Systems (DSPCS’96)*, Perth, Australia, September 1996.

### **Professional Services and Activities**

**Referee** for scientific journals and conferences

**Member** of ACM and IEEE.

### **Additional Information**

**Visa Status:** Holding US F-1 student visa, authorized for practical training.

**References:** Available upon request.